

Evaluation of Therapeutic Efficacy of Antioxidants in Psoriatic Cases

M Madhulatha¹, Vijayabhaskar M²

ABSTRACT

Introduction: Psoriasis is one of the debilitating diseases of the skin of chronic inflammatory origin. Oxidative stress is considered as the culprit for the oxidant and antioxidant imbalance, resulting in psoriasis.

Objectives: This study was undertaken to know the effects of oxidative stress in the origin and development of psoriasis and to evaluate the beneficial effect of antioxidant therapy in psoriatic patients along with conventional treatment.

Materials and methods: Thirty-three patients of age group 20–60 years with chronic plaque psoriasis, from the outpatient department of Dermatology, Mamata General Hospital, Khammam, Telangana, India were considered for the study. Patients with a duration of disease from 6 months to 2 years were enrolled for the study. The severity of psoriasis was determined using the psoriasis area severity index (PASI). Informed consent from the patients and institutional ethical committee clearance were taken.

Antioxidant therapy was given for 8 weeks along with conventional therapy. Malondialdehyde (MDA) and total antioxidant capacity were measured and compared before and after the therapy.

Results: After antioxidant therapy for 8 weeks, it was observed that there was a significant decrease in mean serum levels of MDA and increased levels of total antioxidant capacity (TAC).

Conclusion: The results revealed that antioxidant therapy along with conventional therapy of psoriasis is more beneficial in the treatment of psoriatic cases.

Keywords: Antioxidants, MDA, Oxidative stress, Psoriasis, Total antioxidant capacity.

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Psoriasis is one of the debilitating diseases of the skin of chronic inflammatory origin, affecting an average of 2% of the populace.¹ The disease characteristically manifests as erythema, itching, thickening, and scaling of the skin, mostly affecting soles and palms. Apart from the above mentioned areas, psoriasis also involves the other parts of the body such as scalp, knee, elbow and sacral regions.²

Constant exposure to harmful oxidants results in a free radical generation, which in turn leads to inflammatory changes in the skin. The deficiency of antioxidants makes the skin more prone to oxidative stress resulting in psoriatic inflammatory reaction.³ These reactive oxygen species molecules are harmful enough to cause oxidative injury to the keratinocytes of the skin by various biochemical reactions such as peroxidation of lipids, modification of the DNA and release of cytokines that cause inflammatory changes.^{4,5}

MATERIALS AND METHODS

Thirty-three patients of the age group 20–60 years with chronic plaque psoriasis, from the outpatient department of Dermatology, Mamata General Hospital, Khammam were included for the study. Patients with a duration of disease from 6 months to 2 years were considered for the study. Diabetic, renal, hypertensive liver dysfunction, coronary heart disease patients were excluded from the study. Subjects on antioxidant supplements, chronic alcoholics and smokers were also not considered for the study. Informed consent from the patients and institutional ethical committee clearance were taken.

Fasting blood sample of 5 mL was collected under aseptic precautions. The serum was separated and aliquoted for storage at –80°C until further analysis. The patients were given antioxidant therapy for 8 weeks, per orum tablet antoxid HC, which contains beta carotene 30 mg, zinc sulfate monohydrate 27.5 mg, monohydrated selenium dioxide 0.2 mg, manganese 2 mg, and

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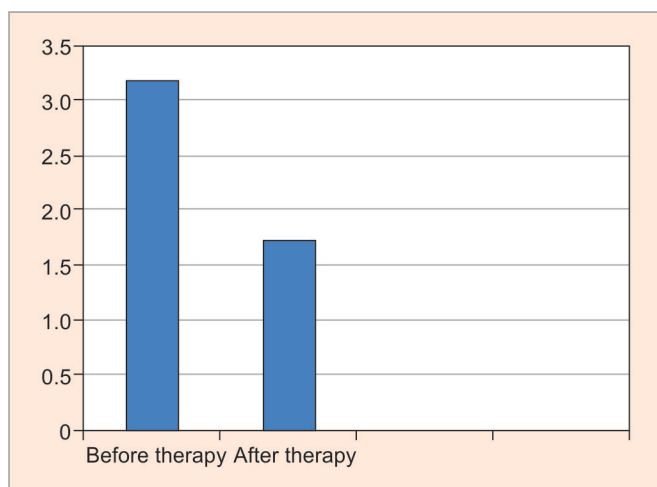
copper 1 mg. The serum levels of MDA and TAC were measured before (day 0) and after (day 56) therapy. Out of 33 patients only 30 completed the study. The malondialdehyde (MDA) levels were determined as Thiobarbituric acid reactive substances (TBARS).⁶ The TAC was measured using ferric reducing ability of plasma (FRAP) assay.⁷ The severity of psoriasis was determined using the PASI.

Statistical Analysis

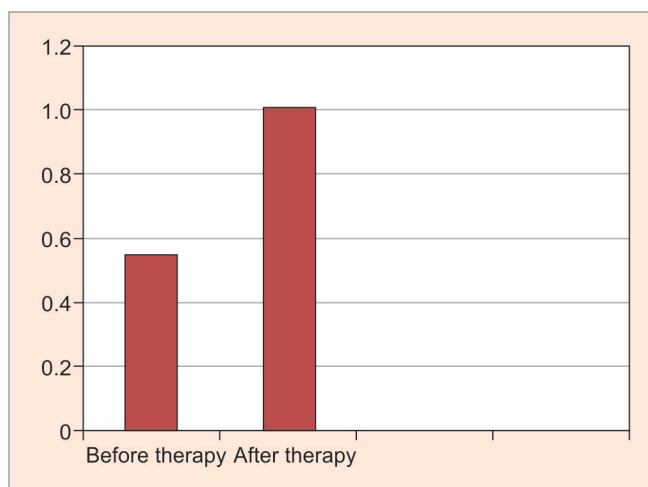
The results were analyzed statistically using mean and standard deviation and compared with student's t-test before and after antioxidant therapy. The significance of 'p' value was set at 0.001.

RESULTS

The mean level of MDA before antioxidant therapy was 3.18 ± 0.92 nmol/mL and after antioxidant therapy, it was 1.74 ± 0.42 nmol/mL (Graphs 1 and 2). The t-test showed a significant decrease (<0.001) in the mean values (Table 1).



Graph1: Serum malondialdehyde (MDA) levels before and after therapy



Graph 2 : Serum TAC levels before and after therapy

Table 1: Mean levels of MDA and TAC before and after therapy.

| Parameter | Cases before therapy mean ± SD | Cases after therapy mean ± SD | p value |
|---------------|--------------------------------|-------------------------------|---------|
| MDA (nmol/mL) | 3.18 ± 0.92 | 1.74 ± 0.42 | <0.001 |
| TAC (umol/ml) | 0.55±0.17 | 1.01 ± 0.31 | <0.001 |

MDA, malondialdehyde; TAC, total antioxidant capacity

Whereas the mean TAC level in patients before antioxidant therapy was $0.55 \pm 0.17 \mu\text{mol/mL}$ and after antioxidant therapy was $1.01 \pm 0.31 \text{ mol/mL}$. The mean difference in t-test showed a significant increase in the values (<0.001) (Table 1).

DISCUSSION

According to Wolters M and Guptha et al., the oxidative stress plays a crucial role in the development of psoriatic changes in the skin,^{1,8} but Naldi et al. observed that the antioxidants have protective efficacy from the harmful reactive oxygen species molecules that cause this oxidative stress. To maintain adequate antioxidant status, the balance between the harmful oxidants and protective antioxidants is a necessity.⁹

In two different studies, Pujari et al. and Azzini et al., observed that the malondialdehyde concentrations in the serum of psoriatic patients were elevated, indicating the higher lipid peroxidation caused by oxidative stress. They also observed that the serum levels of selenium α , tocopherol, and β carotene were decreased suggesting the deprived antioxidant status.^{10,11}

It was also observed by various authors, that the decreased serum selenium is directly proportional to the progression and severity of the psoriatic lesions.¹²⁻¹⁵ Serwin et al. found that, when compared to healthy controls, psoriatic patients with disease affecting more than three years have low levels of selenium ($38.69 \text{ vs } 48.41; p < 0.05$) and he also opined that the low serum selenium levels can be attributed to inadequate nutrition or increased desquamation of the skin.¹⁶

Wolters, in his study on psoriasis in relation to diet, explored that the antioxidant supplementation in the treatment of psoriasis is proved beneficial.¹ Fairris et al. and Pinton et al. observed that the supplement of sodium selenite and sodium selenate were also useful in treating psoriasis.^{13,15} Further, Kharaeva et al. in his study on clinical and biochemical effects of vitamin E, coenzyme Q10 and selenium supplementation in psoriatic patients observed that the above supplementation along with the conventional treatment

resulted in decreased oxidative stress in severe psoriatic patients, which in turn facilitated the faster recovery of the psoriatic lesions.⁴

Extensive exfoliation of skin in severe psoriasis, not only reduced the serum selenium levels but of zinc (Zn) too. McMillan and Nigam et al. in respective studies observed the same when compared the severely affected psoriatic patients with minimal skin lesions.^{17,18}

Strict relationship between copper/zinc ratio and systemic oxidative stress was reported by Mezzetti et al.¹⁹ Black et al. studied the mechanism of pro- and antioxidation and observed the photoprotective potential of antioxidants.²⁰ Maintz et al. in his study demonstrated the beneficial effects of micronutrient supplementation on the skin immune system.²¹

In the present work, we studied the therapeutic effects of antioxidant supplementation on the levels of MDA and TAC along with conventional therapy. MDA levels were determined as TBARS²⁰ and the TAC was measured using FRAP assay.⁷ It was observed that the antioxidant supplementation therapy along with conventional therapy for 8 weeks, in psoriatic patients, resulted in a significant decrease in mean serum levels of MDA, while the TAC levels increased significantly. Relhan et al. in their study observed the same results corresponding to the present study.²² Yildirim et al. observed that the antioxidant supplementation in psoriatic patients increased the levels of MDA in the skin, erythrocytes, and serum when compared the same in controls.²³ Kharaeva et al. observed that the 5-week supplementation of coenzyme Q10, vitamin E, and selenium along with the conventional therapy has shown significant improvement in the clinical condition of erythrodermic and arthropathic psoriatic patients, which was attributed to the reduced oxidative stress after the therapy.⁴ Supplementation using inorganic forms of selenium (sodium selenite and selenate) is also reported to lead to clinical improvement in patients with psoriasis.^{13,15}

CONCLUSION

Psoriasis may substantially affect the quality of life. Many treatment modalities are available which may allow short-term

improvement and long-term control of the disease, but these measures do not lead to complete clearing of psoriasis. Increased oxidative stress is observed in patients with psoriasis. Psoriatic cases should be evaluated for the status of oxidative stress, which can help in the management of these cases. Antioxidant supplementation can reduce the overall morbidity, enhance the prognosis of psoriasis.

LIMITATIONS

To date, only a few studies have investigated the effect of antioxidant supplementation in psoriatic cases. Longer duration of antioxidants, use of other types of antioxidants in a larger number of psoriasis patients might have explored a better potential therapeutic efficacy of antioxidants in psoriasis therapy.

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